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*Electrical & Computer Engineering*  
**S E M I N A R**  
Louisiana State University

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**Event-Driven Control of Cyber-Physical  
Systems with Application to Smart Cities**

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**Abstract**—A cyber-physical system (CPS) is a system in which computation systems interact with physical processes. Control systems in a CPS application often include algorithms that react to sensor data by issuing control signals via actors to the physical components of the CPS. In the first part of the talk, two examples are given to demonstrate that event-triggered control outperforms traditional time-triggered control for stochastic cyber-physical systems in terms of mean-square state variations, which both having the same control cost. In the second part of the talk, some selected results on event-triggered control of multi-agent systems are presented. It is shown that consensus can be reached under asynchronous aperiodic intermittent communication between neighboring agents. Furthermore, the elapsed time between any two successive triggering instants for any pair of linked agents is lower bounded by a constant. In the third part of the talk, a hybrid system model is presented to describe the behavior of multiple agents cooperating to solve an optimal coverage problem under energy depletion and repletion constraints. The model captures the controlled switching of agents between coverage (when energy is depleted) and battery charging (when energy is replenished) modes. In the last part of the talk, smart cities are viewed as cyber-physical systems with particular application to autonomous vehicles in urban environments. An optimal speed profile is developed for autonomous vehicles approaching a traffic light without stopping. The design objective is to achieve both short travel time and low energy consumption as well as avoid idling at a red light.

**Bio**—Xiangyu Meng received his Ph.D. degree in Control Systems from the University of Alberta in 2014. He was a Research Associate in the Department of Mechanical Engineering at the University of Hong Kong between June 2007 and July 2007, and between November 2007 and January 2008. He was a Research Award Recipient in the Department of Electrical and Computer Engineering at the University of Alberta between February 2009 and August 2010. In December 2014, he joined the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, as a Research Fellow. Since January 2017, he has been with the Division of Systems Engineering at the Boston University where he is a Postdoctoral Associate. His research interests include multi-agent systems, event-triggered control, connected and autonomous vehicles, and cyber-physical systems.

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**Where:** Room 3285 Patrick F. Taylor Hall  
**Info:** <http://www.lsu.edu/eng/ece/seminar>

